DESIGN OF A SUMMIT SWITCH YARD

FOR

I. C. R. R., CHICAGO DIVISION

BY

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Armour Institute of Technology

1908

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A THESIS

PRESENTED BY

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TO THE

PRESIDENT AND FACULTY

OF

ARMOUR INSTITUTE OF TECHNOLOGY

FOR THE DEGREE OF

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

HAVING COMPLETED THE PRESCRIBED COURSE OF STUDY IN

CIVIL ENGINEERING

May 22, 1908.

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The Illinois Central Railroad enters the City of Chicago from the south and in addition to their passenger terminal at Twelfth Street, has three freight yards where nearly all of their freight is handled. These yards are located on the right of way, at Randolph Street called the North Yard; at Eighty-eighth Street called the Fordham Yard and at One Hundred and Twenty-eighth Street known as the Wildwood Yard. These three yards handle between 200,000 and 215,000 cars per month and owing to lack of trackage conditions are congested.

The Wildwood Yard is used only for the handling of the coal traffic; the Randolph Street yard is used for local delivery and receiving purposes, while all the classifying of freight and making up of out-going freight trains is done at the Fordham yard. It is in the Fordham yard that the most serious congestion takes place, owing to the lack of room and the inferior lay-out of the yard. Because of its small size and its peculiar shape, the present yard cannot be reconstructed to form a modern yard without the purchase of additional land, which has been built up, making its cost prohibitive. Other reasons for not enlarging the present yard are: It is limited on the east by the Nickel Plate Ry. right-of-way; streets would have to be closed; the Calumet Electric Railway crosses the right-of-way south of the yard; and traffic through the yard would be greatly disturbed during reconstruction. For these reasons it is considered inexpedient and too expensive to reconstruct the Fordham yard and, therefore, a new location is necessary.

The location must be such, that sufficient land may be secured, that the topography will allow of proper grades in the yard without excessive earthwork, and that good drainage may be secured. The cost of the land is

also a deciding factor. The only site near the Illinois Central that fulfills these conditions and is close to distributing points in Chicago, is the tract of land between Harvey and Homewood adjacent to the Illinois Central right-of-way on the east side. This tract is three and one-third miles long and about one thousand feet wide, having a positive slope from north to south. This promotes drainage and gives good grades. The land is neither built up nor under cultivation and its cost is, therefore, moderate.

Freight yards may be divided into four general classes; push and pull yards, poling yards, gravity yards, and summit yards. Each of these is divided up into yards for receiving, classification, and forwarding of trains. Push and pull yards are constructed on the level or as nearly so as possible, and the cars are classified and distributed by pushing and pulling from one place to another. Poling yards are those in which the movement of trains is produced by the use of a pole or a stake operated by an engine on a track that is parallel and adjacent to that on which the cars are situated. A gravity yard is one in which movements of cars are accomplished by gravity alone. A summit yard is one in which movements of cars are accomplished by pushing them over a summit and then letting them run by gravity.

In choosing the kind of yard to be used in the present work, these four types were considered. The two types, of push and pull and of gravity may be eliminated at once, the former because it is antiquated and the latter because it is unsuited to prevailing conditions. This is the case because a gravity yard is operated by gravity alone and so is suitable for switching in one direction only. Since in the yard to be designed, trains are received from both directions it is apparent that the gravity yard cannot be used.

There is then left the poling and the summit yards to choose from. Of these two types, the latter is the more economical in operation and in repairs to cars damaged in the yard. This is shown by the following tables given in the "Proceedings of the American Maintenance of Way Association" (1906).

HASELTON YARD

No. of trains observed	35
No. of cars observed	1242
Total number of cuts	494
Average number of cars per train	35.5
Average number of cuts per train	14.1
Average number of cars per cut	2.51
Total time consumed from time train starts for hump until cars are disposed of and engine returns and clears hump track	525 minutes
Average per train	15 "
Average per car	0.42 "
Total delays at hump waiting for rider	115 "
Actual time required to handle said cars over hump (525 - 115)	420 "
Average per train	11.71 "
Average per car	.33 "

During time of observation one train of 44 cars with five cuts was handled over the hump in 8 minutes giving an average per car of .18 minutes.

Total cars handled over this hump

Sept., 1905, day 15919

Sept., 1905,	night	13163
Oct., 1905,	day	17260
" "	night	13853
Average per 24 hours		987

In a paper read before the New York Railway Club in December, 1903, Mr. L. C. Bardo gave the following data as the result of a series of experiments in various typical railroad yards. The paper was considered in the 1906 meeting of the Association.

Type of yard	Push & Pull	Poling	Hump
No. of cars	60	60	60
No. of cuts	50	50	50
Crew	Engineer	do	do
	Fireman	do	do
	Conductor	do	do
	2 Trainmen	6 Trainmen	do
Time consumed	2 hours	1 hr. 15 min.	30 minutes
Average expense	$2.44	$2.53	$1.02
Distance traveled by locomotive	24750'	24750'	6000'
Engine reversals	120	120	60

These results show the great economy in operation of a hump yard. Other yards show results which are just as good. From this data the Association adopted the following resolution, "A hump yard is a desirable form of a yard for receiving, classifying and making up trains because cars can be handled through it faster and at less cost than through any other yard." The fact that there

is less damage done to cars in a hump yard than in other kinds of yards may seem to be untrue but with careful braking, damage due to bumping may be entirely eliminated in a summit yard while in a poling yard frequent starting and stopping must occur and the result is a large amount of damage to couplers and draft gears. For the above reasons the summit type of yard was adopted.

The following general data was obtained, at the offices of the Illinois Central road, as general practice in their yards and as following the lines on which a new yard would be built.

Purpose of yard	Distributing
Kind of freight	Non-perishable
Direction of traffic	Both north and south
No. of cars handled per month	30000 to 40000
Maximum length of trains	80 cars
Capacity of cars	60000# to 100,000#
Average length of cars	40'
Frog number	7 and 8

The length of receiving yard is determined from the following data; the length of a train of loaded cars, the length of a train of empty cars, the average length of a train, the number of average length trains per day, and the number of maximum length trains per day. If the number of maximum length trains exceeds twenty per cent of the total number of trains, the receiving yard is to be designed for the trains of maximum length. The latter is the case and the yard was, therefore, designed for trains of eighty cars with cabooses and engines. The length of the longest Illinois Central freight engine is fifty six feet. The train length is, therefore, three thousand, two hundred and ninety six feet, but

the yard was made thirty four hundred feet long to allow for clearance. Nine tracks were provided, all of the same length, these being sufficient to handle twelve hours traffic, which is in excess of the number provided in the specifications of the American Maintenance of Way Association. These tracks are to be used in making minor repairs and thus one or more may be thrown out of service while occupied for this purpose. To allow for this work, the tracks are spaced fourteen feet center to center. Number nine frogs are used in the turnouts from the main tracks and also in all turnouts from the ladder tracks. This is the smallest number of frogs used in any switch over which a road engine will pass. The practical lead was assumed to be seventy two feet for a number nine frog. The distance along the ladder track from a frog to the next head block was made ten feet. The turnouts from the ladder through the middle of the yard were provided with number eight frogs. The main ladder track was put in at an angle of 8°25' to the main track, the body tracks being curved for a small distance past the frog. The south bound receiving yard is on a grade of five-tenths per cent. The north bound receiving yard is on a three hundred and seventy two thousanths per cent grade, both being positive going south. The capacity of the south bound receiving yard is seven hundred and twenty cars, but this number may be reduced when the yard is first constructed by leaving out some of the tracks or by using some of them for storage.

The south bound receiving yard is connected with the hump by a drill or hill track, which is run around the classification yard of the north bound hump. This drill track must be on such a grade that it will make the elevation of the hump in the least possible distance and thus allow the yards to

be placed close to each other. The maximum grade on these tracks was made one per cent. This is heavier than that recommended by the American Maintenance of Way Association, but is not as heavy as that recommended by Mr. H. M. North. The south bound hill tracks are placed fifty feet from the north bound classification tracks, which allows for a difference of elevation of twenty feet. The fill between the hill tracks and classification yard was assumed to have a two to one slope, the reason for this is that the material that would be used for fill is lake sand. This sand is very fine and has a small angle of repose. The turn around the end of the classification yard is negotiated by two curves connected by a tangent. The first of these is four degrees and fifteen mintues and the second is two degrees.

The humps and hump grades lie on a straightaway. The grade of the hump tracks must be such at the start that each car or cut of cars will be given a quick start as it passes over the hump. This requires a sharp grade below the crest but this can be eased and the grade reduced until it is such, that sufficient momentum will be gained, by the time the ladder is reached, to carry the cars over the switches. The ladder tracks and the body tracks to the end of the yard are also put on a grade to carry [the cars through] the classification yard. It is necessary that these grades be heavy enough to give the cars sufficient speed at all points, especially at the throat of the yard since delays at that point will offset efficient operation in the classification yard. The speed attained on the hump should be maintained constant to the end of the ladder tracks. This will make it certain that all

cars will reach their classification tracks at the same rate of speed, no matter which track they are switched onto. The grades on the ladders must be such as to overcome the resistance due to the switches, the curvature, the track, the journal friction and also to provide for hard running cars. These cars will lag on the ladders and stick on the classification tracks, slowing up work on the ladders and blocking the tracks in the classification yard. To avoid this, the grades are increased and the average cars allowed to run faster. In this way, the grades become slightly accelerating. There should be a little grade in the first part of the classification yard to keep the cars drifting. This is often made equal to the track and journal friction. The grade of the rest of the yard should be made level or slightly adverse.

When it comes to choosing grades for the humps in accordance with the theories that have been stated above, a number of modifying conditions have to be taken into account and to be compensated for if the car is to be given proper speed. These factors are; the curvature of the switch leads, low joints worn rails, lack of ballast, the extra force of the wind on cars when on the hump, and the sudden start necessary. Allowance must be made here also for the hard running cars and the empty cars, which will start slower, run harder and be more effected by the wind than will loaded cars. Since the grades chosen finally will take care of all these adverse conditions of wind, track and loadin it follows that the free running cars would, if they were left unbraked, gain a much higher speed and would get beyond control. The brakes are, therefore, depended upon to keep the speed of the cars within safe limits. Notwithstandin the fact that cars may be braked, the damage due to collisions and bumping is

greatly increased with increase of grade and this partly balances the benefits of such increase. The majority of the smash-ups are due to the failure of brakes to act and will, therefore, occur on the lightest of gradients. For this reason it is useless to try to balance efficiency of operation and prevention of car damages. This is shown by the fact that in several yards, the hump grades have been increased with good results and little effect on car damage. This is true of the Pitcairn and Altoona yards of the Pennsylvania system. The grades that have been adopted are based on those of the Dupo yard of the Gould system, but because of the more northern location which will increase the car resistance in winter and because of the velocity of the prevailing winds the grades adopted are slightly more extreme. The adopted grades are 4% acceleration grade for 25', below this a 1% grade for 175' and then 200' of a 4% grade. Vertical curves of 1500' radius are placed between the 1% and 4% grades and between the 4% grade and the 1.2% grade of the ladder. The scales, which are 60' long, are placed on the 1% grade. The leads to the dead tracks are to be made 40' long, which is sufficient to make the distance by which the dead rail track is separated from the scale track. This distance is 14", which is the standard of the American Maintenance of Way Association. The total length of scale and leads is, therefore, 140' and these can be placed on the stretch of 1% grade with sufficient approach to make the cars run easy at the scales. Any standard make of track scales will be acceptable, but an automatic attachment to register the weights of the cars is necessary since the cars will run over the scales at a speed that is too great to permit sight readings. The scales on the two humps are placed opposite

each other. To allow this the summits of the humps are 300' apart and the 1% grades are opposite each other. This arrangement makes the work on the foundations of the scale pits more economical and will permit better superintendence by the Weighmaster.

The ladder tracks are on a 1.2% grade, this amount being necessary to overcome the various resistances mentioned before. A double system of ladders is used, the outer ones diverging on a 4°14' curve, which is the degree of curve for a number 12 frog. The angle of the outer ladders is 8°25' and from each there are turnouts to seven body tracks, these turnouts being put in with number 9 frogs. The body tracks are spaced 12' center to center.

Through the center of the classification yard is run a thoroughfare track, which is a continuation of the hump track, the two outer ladders diverging from it at different points to avoid a three throw switch. The inner ladders diverge from the outer ones at points such that they will be parallel to the thoroughfare track and spaced 15' center to center from it. Eight body tracks diverge from each of the inner ladders, number 9 frogs being used on the turnouts. These tracks are spaced 12' center to center. Between each of these sets of body tracks and the outside ladders is placed a thoroughfare track spaced 15' center to center from the adjacent tracks. The thoroughfare tracks are, therefore, three in number, which is sufficient to give switch engine access to all parts of the yard without using tracks needed for car movements. They are placed next to the ladder tracks in each case and can, therefore, be used for poling tracks to help cars, which are stuck on the ladders. They are in no case to be used to run cars on.

The arrangement of the ladders on the departure end of the classification yard is somewhat different from that of the receiving end. The inner ladder is inclined at an angle of 8°25' to the center line. The seven body tracks in each of the two inner groups are continued parallel to the center line until they reach the turnout curve, 7°25' for the number 9 frogs that were used on the ladders. The eight body tracks in the outer groups are inclined at an angle of 8°25' so that they are parallel to the inside ladder. The outer ladders are the outermost of the tracks in the yard and are inclined to the body tracks they serve at an angle of 8°25', making 16°50' their total inclination to the center line of the yard. Number 9 frogs are used on these ladders as well as on the inner ladders. The outer ladder on each side meets the inner one on a 7°25' curve, as number 9 frogs are used. This leaves three tracks to connect with the departure yards, the thoroughfare track through the center of the yard being the only one retained. The two other thoroughfare tracks are run into the inner ladders at the end of the yard since they are no longer needed.

The grade of all the tracks in the classification yard is that of the ladders as far as the line on which the ladders end. By this plan the greater curvature in the outer tracks is not diminished going towards the inner ones, for the compensation is too small to be subtracted in parts. The grade of the ladders is 1.2% and of the body tracks .4% for 725' and then level to the end.

Each classification yard has 34 body tracks, including the ladders past the last switches, 3 thoroughfare tracks and 4 ladders. Of these only the body tracks can be considered in calculating the capacity of the yard.

The latter is given in the table in which the length of each track is also given.

The three tracks connecting the classification yard with the departure yard are long enough to allow a cross-over to be put in. Groups of cars from the classification tracks can be bunched by using these cross-overs if they are not all from the same half of the yard and, therefore, have not been bunched on the ladders.

There are eleven tracks in each of the departure yards, which will take care of all out-going trains, awaiting departure and can be used for storage in case of emergency. The south bound departure yard is 3400' long, all tracks being of the same length and designed on the same principles that the receiving yards were. A ladder at 709', the angle of a number 8 frog is run across each departure yard to allow of communication through the yard. The lead track is a continuation of the end ladder, which is on an angle of 8°25'. It joins the main track in a switch with a number 10 frog and 6°5' curve. The south bound departure yard is on a .024 grade until it reaches the elevation of the main track when it is continued on the grade of the latter. The north bound departure yard contains the same number of tracks that the south bound one does, but it is shaped in such a way that it conforms to the outline of the south bound receiving yard, which it borders. This yard is on a 0.0% grade until it reaches the level of the south bound receiving tracks at station 36 + 50. Its profile coincides with that of the receiving yard until it reaches the junction of the latter with the main line tracks. The north bound receiving yard is like the south bound receiving yard except that it is on a .372% grade in the direction of traffic.

The north bound hill tracks are on somewhat easier grades than the south

bound ones since they start at a greater elevation and so need not make as great a rise. This makes the north bound hump lower than the south bound hump and is, therefore, conductive to economy in grading. The grades of the south bound hill tracks are: level to station 98; 1% between stations 98 and 89 and 1.5% from 89 to 88, which is the summit of the hump. This 1.5% grade is put in for the purpose of bunching the cars as close as possible before they reach the summit. This makes it easy to uncouple the cars and makes work over the hump faster by eliminating delays.

The two classification yards are the same in all respects.

In the design of the yard consideration had to be given to the fact that many cars arrive without shipping directions and have to be held awaiting orders. The proper place to store these cars depends on the character of the cars to be held. Three distinct cases are given in the "Proceedings of the American Maintenance of Way Association." These are as follows:

First: It may be knownthat entire train loads of business will have to be held on arrival. If this occurs frequently, the storage yard should be located in close relation to the receiving yard, so that trains may be moved directly to the hump.

Second: The cars to be held may arrive mixed in with cars that are to go forward. If this is the general rule, the storage yard should be located in such relation to the classification yard that the cars can be brought to and from it readily.

Third: The character of the freight to be held may be such that it can be put in district and station order at once. In such cases the storage yard should be located in such relation to the classification and departure

yards that cars can be moved directly into the storage yard from the classification yard and then delivered to the departure yard as required.

These are the three principal cases and they show that the design of the storage yard is dependent on the character of the business done. The size of the storage yard is governed by the number of cars to be held. The length of the tracks should be such that a switch engine can readily handle all the cars on one track. This provision is made necessary by the fact that the hold tracks are to be operated by the push and pull plan.

The north bound hold yard was placed with its laddor leading from the track connecting the departure and classification yards. Hold traffic in this direction comes principally under the third classification and, therefore, it is placed as stated. Cross-overs between the drill tracks permit cars to be placed on any departure track. There are 8 tracks in this yard which vary from 1200' to 1600' in length. The yard is designed as a stub yard and is laid out as level throughout.

The south bound hold yard is connected with the tracks between the classification and departure yards, but owing to the necessity of keeping the yard symmetrical in shape, it was put between the hump and main line tracks. This necessitates the running of drill tracks around the south bound classification yard. This yard is also a push and pull, stub yard and contains 8 tracks of the same length as those in the north bound yard. The ladder angles in both are 8°25'. Number 9 frogs are used.

Caboose tracks are provided at both ends of the yard and are connected with both departure and receiving yards. The fact that the two yards with which they connect are for traffic in opposite directions is immaterial. A

caboose can be detached from a train immediately upon its entrance into the receiving tracks and sent to the caboose tracks, while a caboose can be taken from any track in this yard to any track in the departure yard and attached to an out-going train without loss of time. Each caboose yard contains 4 tracks each 600' long and is laid on a level plane.

The round house is placed between the main line tracks and the track connecting the north bound classification and receiving yards. This location was chosen because it was the only place in which a semi-circular house could be placed and still leave room for the connecting tracks. The round house has an outside diameter of 422' and the stalls have a depth of 90'. The turn-table is 85' in diameter and is approached by two tracks, one from the north and one from the south. The stalls are twenty five in number, which is deemed sufficient, since the yards are but a short distance from the main engine houses at Burnside. Road engines would be sent to these houses if they were to be held for any length of time. Very little storage capacity for switch engines is needed since they are worked practically all the time.

The coal chutes, sand house and stand pipe for supplying the engines with water are situated south of the round house. They are made easy of access by being placed adjacent to the track leading from the turntable to the south bound departure tracks. This track is connected to the north drill track from the round house by a track around the turntable. This allows engines to leave the turntable by either track and still go directly to the coaling tracks. A passing track is placed around the portion of the coaling tracks, on which engines must stand when coaling.

The ash pits are to the north of the round house and are bordered by

the track leading directly to the turntable. The pit tracks are reached from a cross-over from this track. They are approached from the north by a track, which is parallel to the main line tracks and runs as far north as the end of the south bound receiving yard. Road engines can thus be run directly to the ash pits after being cut off from the incoming trains. Engines from the north bound receiving yards can get to the ash pits by a track, which twins out from the beginning of the hill tracks and is run across to the track, which leads past the round house. This track is connected by a cross-over with the ash tracks.

Out-going engines reach the south bound departure tracks by a track, which is a continuation of the coaling tracks. This track parallels the departure yard until the end of the yard is reached where a cross-over connects it with the outside track of the yard.

Out-going engines to be sent to the north bound departure yard, leave the coaling yard by a switchback that is led around between the back of the round house and the main line, joining the track to the south bound receiving yard in a cross-over. The end of this is connected with the north bound departure yard, so that the engine can reach the latter. Engines that are to be sent out immediately after arrival can go from a receiving yard to the opposite departure yard by the tracks between the two, which are provided for the purpose.

Drainage for the yard must be provided since it is manifestly impossible to allow all the water from the yard to drain into the neighboring fields. Assistance in caring for this water is given by the new agricultural ditch being dug across the country. This ditch crosses the site of the yard at station 27 + 65. It can be carried under the yard by a 72" cast iron pipe culvert. It is of sufficient size to carry the additional drainage of the yard to the little Calumet

River, into which it empties at a distance of about 1-3/4 miles from the site of the yard. The side drainage is to be taken care of by standard size ditches at either side of the yard emptying into the main ditch. The ditches south of the main one can be dug on the natural slope, which is sufficient. The ditches north of the main one must be laid on an artificial slope, which can be accomplished for the short distance required. Three lines of tile are placed longitudinally through the yard. These tiles are 6" in diameter and are laid on a .5% grade emptying into the main ditch. These tiles are to be laid below the natural surface to keep the ground water from rising. They will also take care of seepage.

The length of tracks and their capacity are given on the accompanying bill of material. A table of earth work is also given.

	AREA.		CU. YDS.	
STA.	EMBK.	EXC.	EMBK.	EXC.
0	0.0			
1	180.76		334.7	
2	363.62		1008.1	
3	461.11		1527.3	
4	519.06		1815.1	
5	604.42		2080.6	
6	689.23		2395.7	
7	772.42		2706.8	
8	832.68		2972.6	
9	963.34		3225.9	
10	1021.72		3676.0	
11	1198.61		4108.0	
12	1473.07		4947.5	
13	1590.43		5653.1	
14	1722.47		6135.0	
15	1901.65		6711.3	
16	2123.50		7454.0	
17	2189.71		7987.5	
18	2413.82		8525.1	
19	2672.43		9418.9	
20	2860.48		10246.1	
21	2989.23		10832.8	
22	3167.45		11401.3	
23	3384.41		12133.1	
24	3398.22		12560.4	

	AREA.		CU. YDS.	
STA.	EMBK.	EXC.	EMBK.	EXC.
25	3671.24		13091.6	
26	4005.18		14216.0	
27	4117.60		15043.1	
28	4345.77		15673.0	
29	4396.91		16190.2	
30	4508.24		16419.0	
31	4728.32		17104.7	
32	5116.11		18230.4	
33	5421.28		19513.7	
34	5626.76		20459.2	
35	6032.63		21591.4	
36	6319.14		22873.6	
37	6704.72		24118.2	
38	6910.33		25213.1	
39	6280.08		26277.4	
40	7566.68		27460.6	
41	7603.92		29093.7	
42	7494.46		27826.6	
43	7016.21		26871.6	
44	6911.37		25791.8	
45	6772.90		25341.2	
46	6713.21		24974.3	
47	6544.32		24551.0	
48	6488.67		24135.2	
49	6417.12		23899.6	

	AREA		CU.YDS.	
STA.	EMBK.	EXC.	EMBK.	EXC.
50	6380.76		23699.8	
51	6582.82		24005.2	
52	6879.71		24929.1	
53	7133.34		25950.2	
54	7317.22		26760.3	
55	7605.96		27635.4	
56	7917.32		28746.8	
57	8002.24		29480.7	
58	8217.70		30036.9	
59	8281.81		30555.8	
60	8385.50		30865.4	
61	8484.23		31340.2	
62	8597.42		31632.7	
63	8681.71		31998.4	
64	8838.67		32445.1	
65	9070.43		32998.3	
66	9131.81		33707.9	
67	9267.02		34071.9	
68	9392.91		34553.4	
69	9417.86		34834.8	
70	9480.24		34996.5	
71	9370.88		34909.5	
72	9481.76		34912.3	
73	9622.32		35377.9	
74	9637.81		35666.9	

	AREA		CU. YDS.	
STA.	EMBK.	EXC.	EMBK.	EXC.
75	9698.24		35807.5	
76	9772.12		36056.2	
77	9789.43		36226.2	
78	9876.10		36417.7	
79	9943.23		36702.4	
80	9994.10		36921.0	
81	9981.42		36991.7	
82	9912.32		36729.1	
83	9879.17		36650.9	
84	9865.44		36564.1	
85	9860.20		36343.8	
86	9734.32		36286.1	
87	9699.22		35988.0	
88	10040.00		36554.2	
89	9972.14		37059.5	
90	9834.63		36679.2	
91	9743.01		36254.7	
92	9506.00		35646.3	
93	9473.31		35143.5	
94	9426.24		34999.2	
95	9333.31		34739.9	
96	9271.66		34453.7	
97	9219.20		34242.3	
98	9173.47		34060.5	
99	9148.15		33928.9	

	AREA		CU. YDS.	
STA.	EMBK.	EXC.	EMBK.	EXC.
100	9052.60		33705.1	
101	8872.01		33193.7	
102	8599.22		32354.1	
103	8244.41		31191.9	
104	8018.37		30116.3	
105	7783.65		29163.0	
106	7434.13		28181.0	
107	7154.24		27043.3	
108	6883.45		25995.7	
109	6681.90		25121.0	
110	6382.24		24192.8	
111	5911.79		22766.6	
112	5619.00		21353.3	
113	5523.16		20633.6	
114	5148.53		19762.4	
115	4997.42		18788.8	
116	4436.81		17436.2	
117	4110.42		15717.1	
118	3919.36		14869.9	
119	3873.13		14430.5	
120	3630.50		13895.6	
121	3627.42		13440.6	
122	3678.27		13529.1	
123	3708.33		13678.9	
124	3912.41		14112.5	

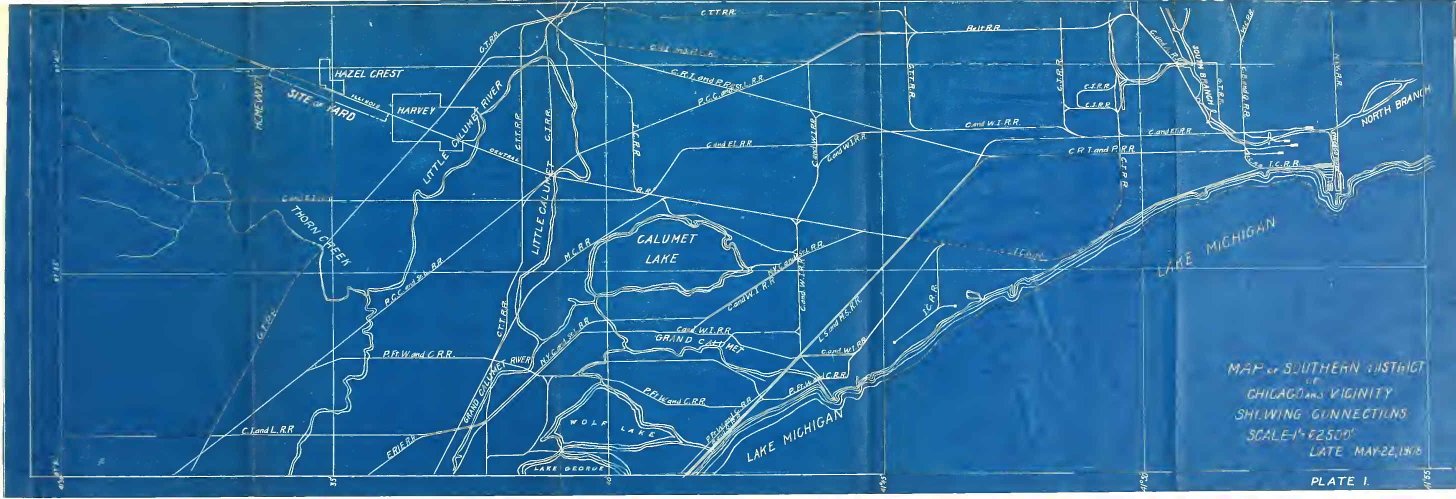
	AREA		CU. YDS.	
STA.	EMBK.	EXC.	EMBK.	EXC.
125	4482.60		15546.3	
126	4678.37		16964.8	
127	4819.35		17577.3	
128	4936.42		18066.3	
129	5217.03		18802.7	
130	5330.84		19532.9	
131	5124.36		19361.4	
132	4875.24		18518.0	
133	4590.50		17529.1	
134	4362.92		16569.3	
135	4004.36		15498.9	
136	3783.48		14394.1	
137	3370.30		13247.7	
138	3085.76		11955.7	
139	2790.80		10882.5	
140	2530.62		9854.5	
141	2296.54		8939.2	
142	2056.20		8060.6	
143	1794.60		7131.1	
144	1584.72		6258.0	
145	1356.12		5446.0	
+30	1310.44	0.0	1481.4	
146	1250.18	110.60	3319.3	143.3
147	1028.28	186.12	4219.4	549.5
148	788.44	250.24	3364.3	808.1

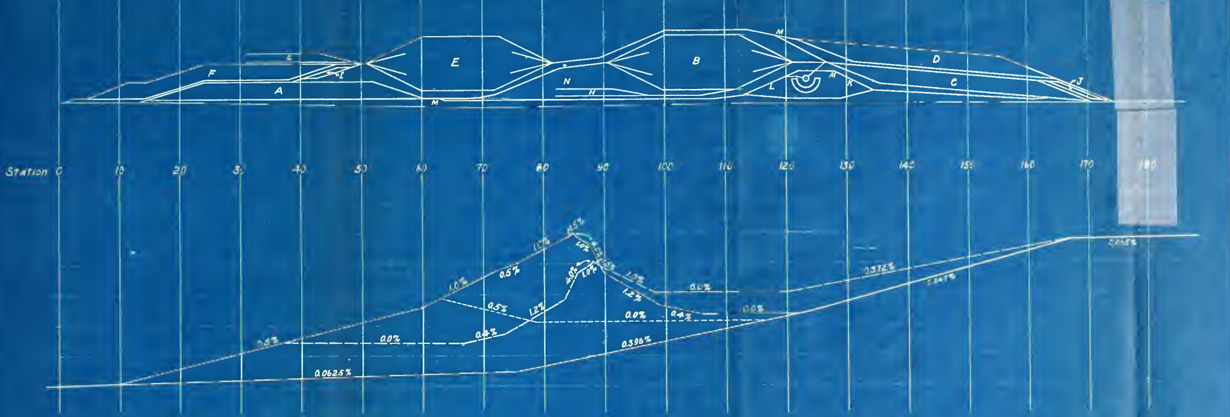
	AREA		CU. YDS.	
STA.	EMBK.	EXC.	EMBK.	EXC.
149	562.50	364.16	2501.7	1137.8
150	390.24	470.60	1764.3	1545.8
151	254.62	556.70	1194.2	1902.4
152	120.40	642.84	694.5	2221.4
153	10.20	740.90	241.9	2562.5
+40	0.00	792.52	7.6	1135.9
154		868.48		1845.5
155		974.62		3413.1
156		1060.80		3769.3
157		1184.32		4157.6
158		1298.10		4597.2
159		1402.04		5000.3
160		1520.24		5411.6
161		1604.16		5785.9
162		1394.82		5553.8
163		1203.64		4811.9
164		1022.50		4122.5
165		753.28		3288.5
166		496.10		2313.7
+50	0.00	328.72		763.7
167	18.90	210.50	17.5	499.3
168	58.74	108.24	143.8	590.3
+70	75.22	0.00	173.7	140.3
169	110.82		103.4	
170	280.18		724.1	

	AREA		CU. YDS.	
STA.	EMBK.	EXC.	EMBK.	EXC.
171	302.10		1078.3	
172	276.52		1071.5	
173	225.28		929.2	
174	72.50		551.4	
175	0.00		134.3	
		TOTAL CUBIC YARDS	3,201,310.4	67060.9

BILL OF MATERIAL

Yard	South Bound Receiving	South Bound Classifying	South Bound Departure	North Bound Receiving	North Bound Classifying	North Bound Departure	South Hold	North Hold	South Caboose	North Caboose	Crossovers Connections	Totals
Number of tracks	11	34	11	11	34	11	8	8	4	6	—	—
Distance c. to c.	14'	12'	14'	14'	12'	14'	12'	12'	12'	12'	—	—
Length of tracks	2700' to 4450'	1800' & 2050'	3350'	3400'	1800' & 2500'	3200'	900' to 1450'	1150' to 1700'	500'	300'	41100'	343000'
Capacity of tracks (cars)	965	1626	913	935	1626	880	232	273	48	42	—	7540
Number of 30' rails	2700	5700	2690	2716	5700	2584	662	780	216	220	2740	26708
Number of ties	21600	45600	21550	21730	45600	20700	5300	6240	1730	1760	21920	213664
Number of splice bars	5400	11400	5400	5450	11400	5200	1350	1400	450	450	5480	53416
Number of spikes	86500	182500	86200	87000	182500	83000	21500	25000	7000	7200	90000	838400
Angle of ladder	9°50' & 7°9'	8°25'	9°50' & 7°9'	9°50' & 7°9'	8°25'	9°50'	8°25'	8°25'	8°25'	8°25'	—	—
Distance head block to head block	82'	82'	82'	82'	82'	82'	82'	82'	82'	82'	—	—
Number sets of switch timbers	23	71	31	31	71	19	7	7	8	10	45	329
Frog number	9 and 8	9 and 12	9 and 8	9 and 8	9 and 12	9	9	9	9	9	9 and 12	—
Number of turnout switches	19	70	20	22	70	17	7	7	8	10	37	237
Length of switch rail	15'	15' and 18'	15'	15' and 18'	15' and 18'	15'	15'	15'	15'	15'	15' and 18'	—
Number of slip switches	10	1	11	9	1	2	—	—	—	—	8	42


MAP OF SOUTHERN DISTRICT
OF
CHICAGO AND VICINITY
SHOWING CONNECTIONS
SCALE 1" = 62500'
DATE MAY-22, 1908
PLATE I.
HAZEL CREST
HARVEY
SITE OF YARD
HOMEWOOD
THORN CREEK
LITTLE CALUMET RIVER
LITTLE CALUMET
CALUMET LAKE
GRAND CALUMET
GRAND CALUMET RIVER
WOLF LAKE
LAKE GEORGE
LAKE MICHIGAN
LAKE MICHIGAN
SOUTH BRANCH
NORTH BRANCH
C.T.T.R.R.
Belt R.R.
G.T.R.R.
C.R.I. and P.R.R.
P.C.C. and St. L. R.R.
C.T.T.R.R.
C.I.R.R.
I.C.R.R.
C. and E.I. R.R.
C. and W.I. R.R.
C.J.R.R.
C.J.R.R.
C.T.P.R.
M.C.R.R.
N.Y.C. and St. L. R.R.
L.S. and M.S. R.R.
P.Ft.W. and C.R.R.
C.I. and L.R.R.
ERIE R.R.



SCALE

Horizontal 1" = 1000'

Vertical Plan 1" = 300'

Profile 1" = 20'

KEY TO PLAN

A South Bound Receiving Yard
B South Bound Classification Yard
C South Bound Departure Yard
D North Bound Receiving Yard
E North Bound Classification Yard
F North Bound Departure Yard
G Hold Yard
H Hold Yard
I Caboose Tracks
J Caboose Tracks
K Coal Chute
L Ash Pits
M Water Tanks
N Offices, Store House, Repair Shop, etc.

KEY TO PROFILE

Main Line Tracks
South Bound Trafic Through Yard
North Bound Trafic Through Yard
South Bound Receiving to Round House

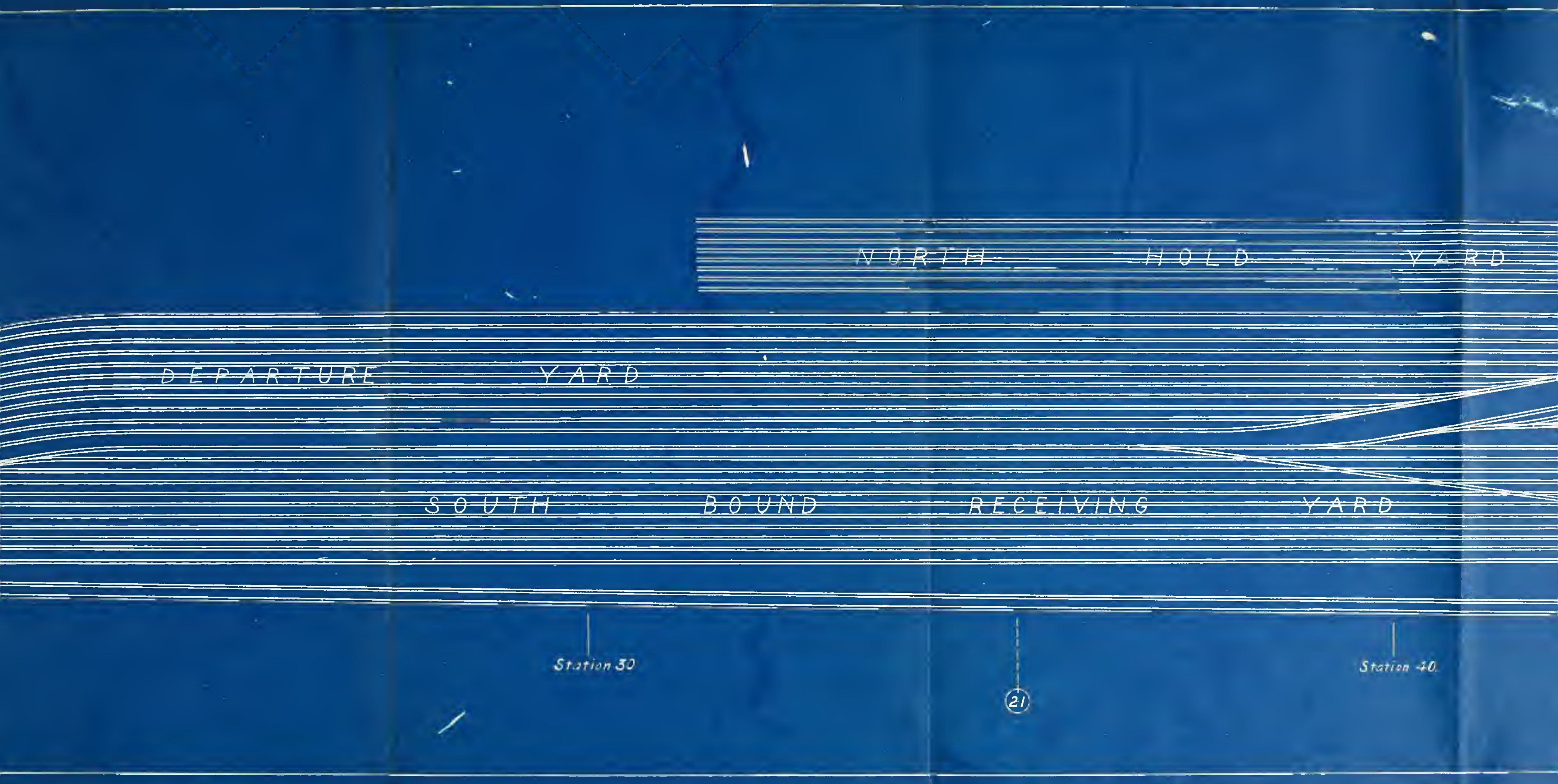
PLATE 2

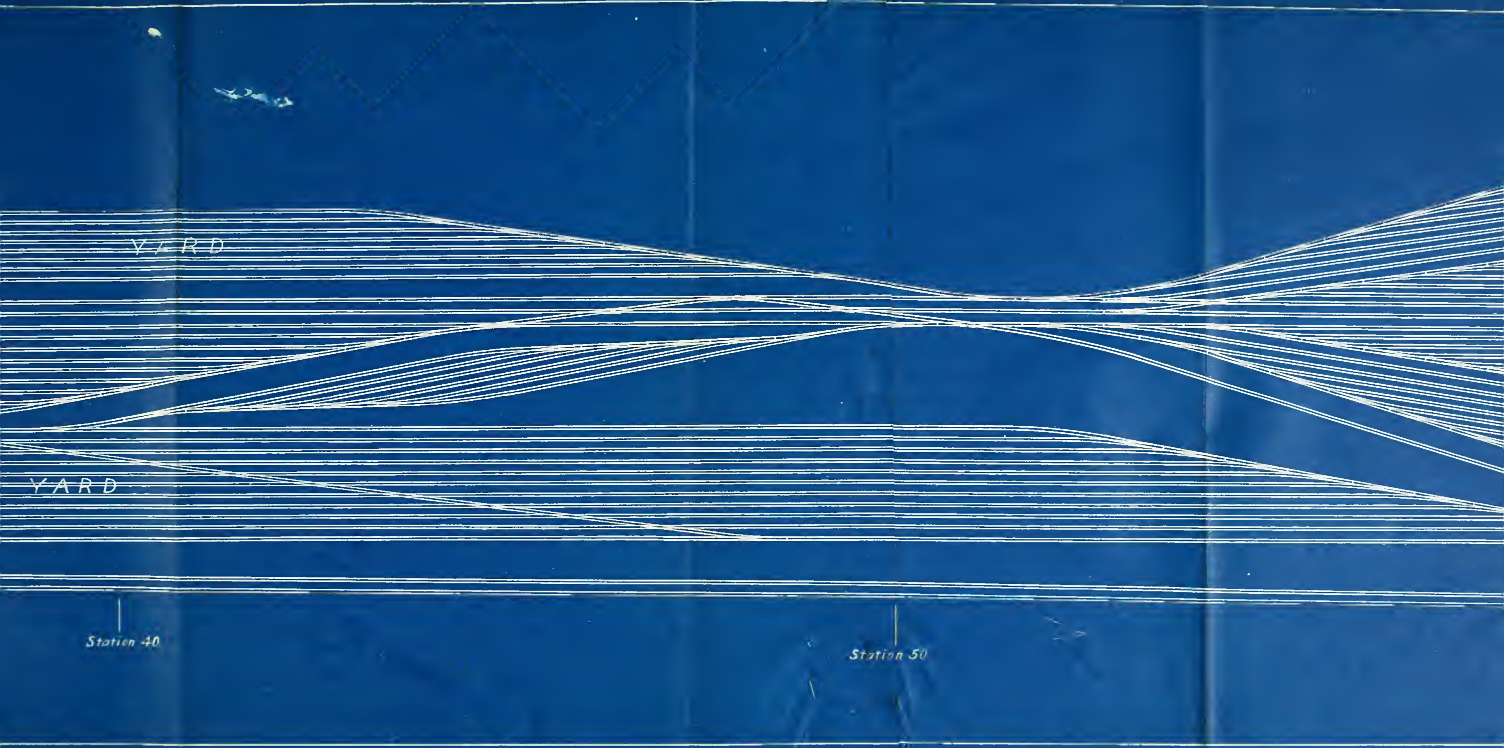
PLATE 3

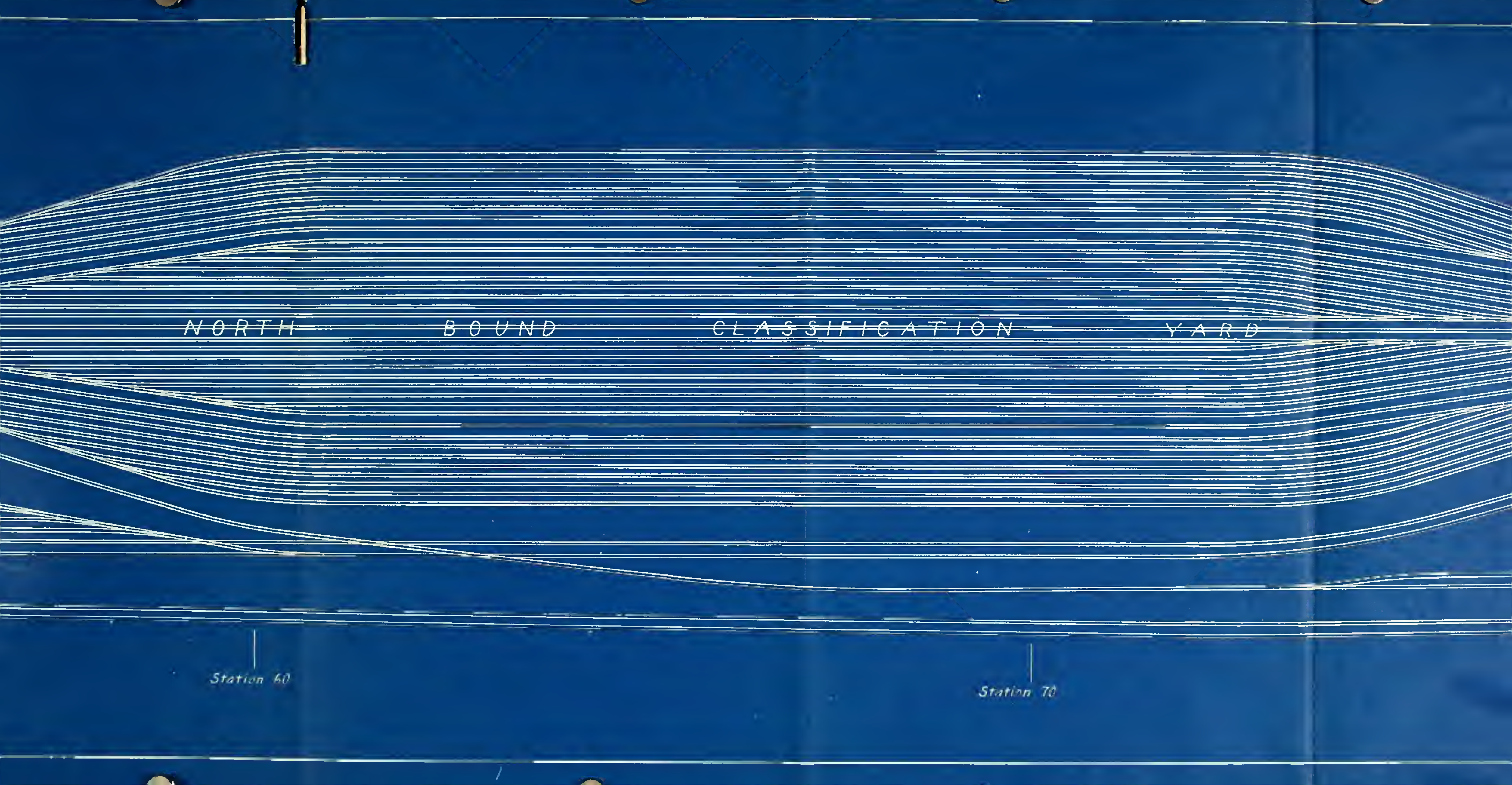
PLAN OF PROPOSED
SUMMIT SWITCHING YARD
ON
I.C.R.R. NEAR HARVEY, ILL.

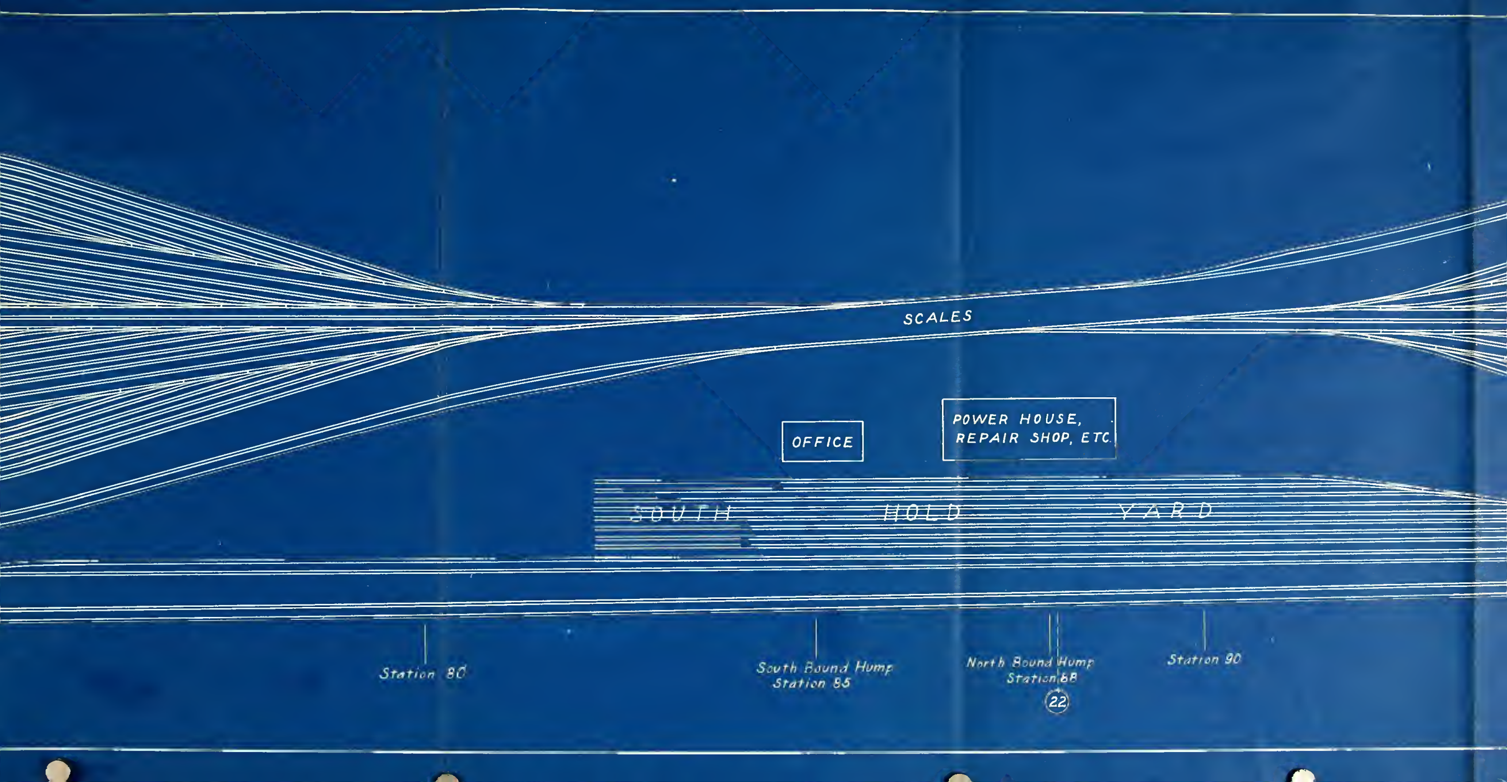
Scale 1" = 100'   May 22, 1908

PLATE 3

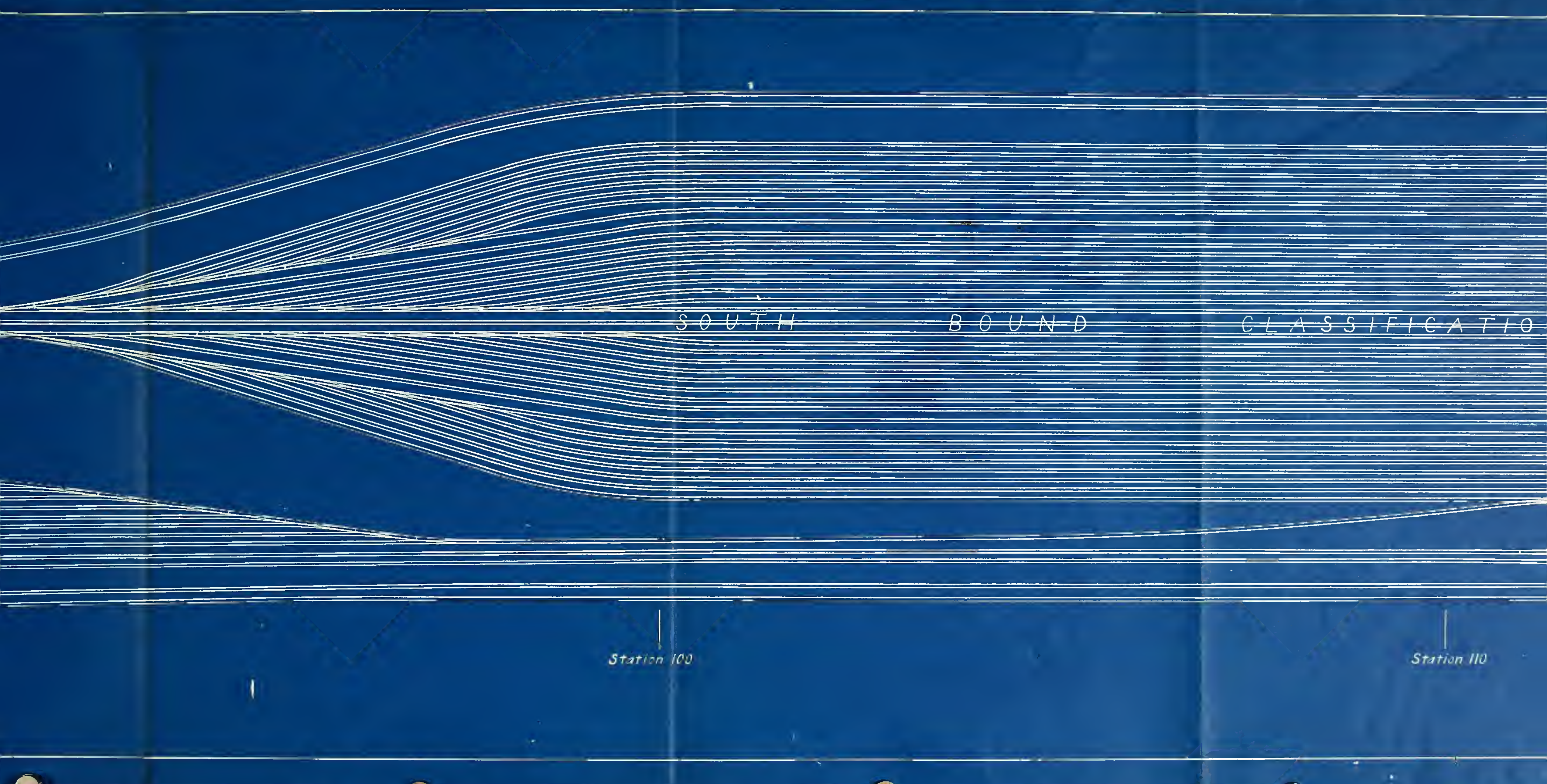

NORTH HOLD YARD
DEPARTURE YARD
SOUTH BOUND RECEIVING YARD
Station 30
Station 40.
21


YARD
YARD
Station 40
Station 50

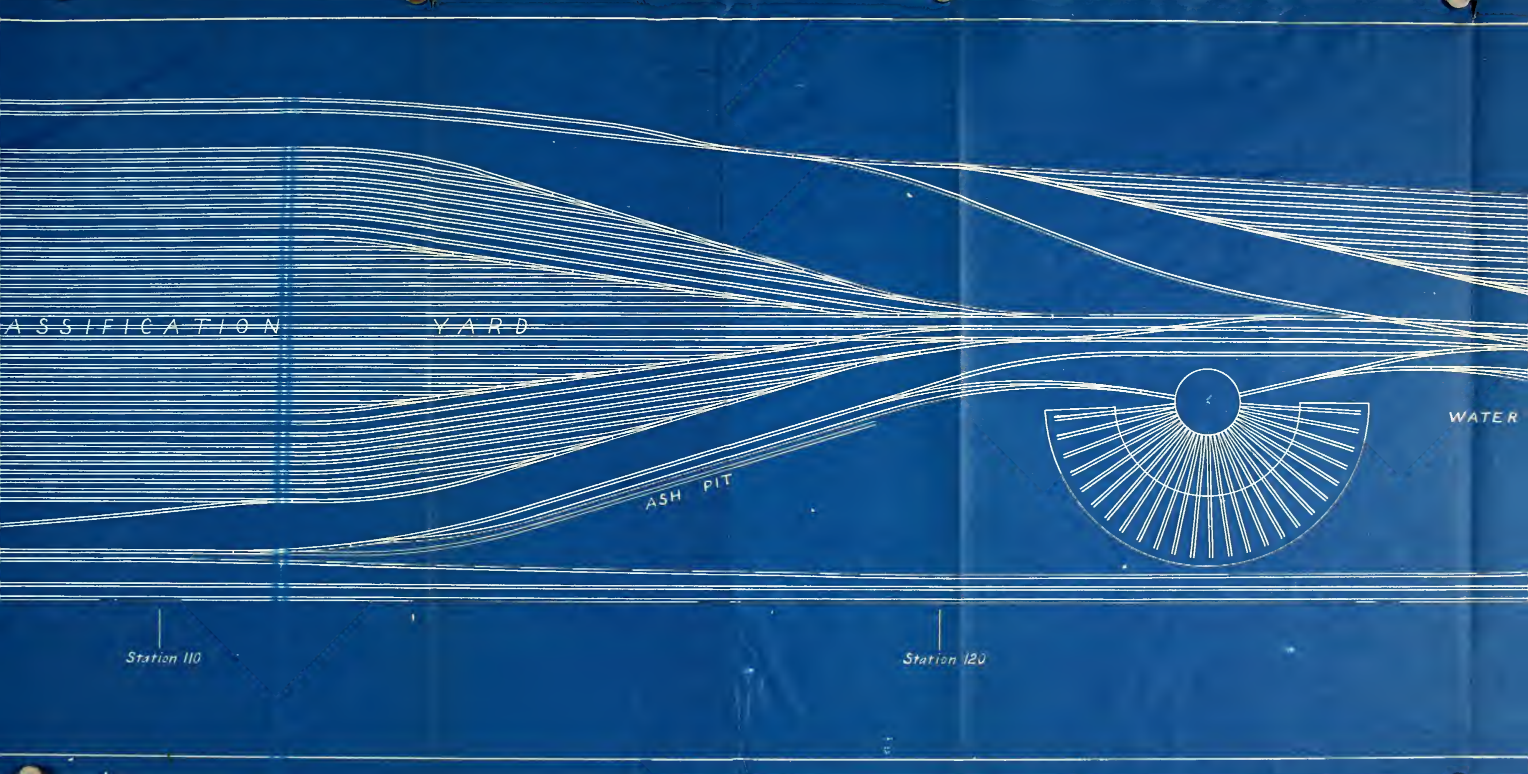

NORTH BOUND CLASSIFICATION YARD
Station 60
Station 70



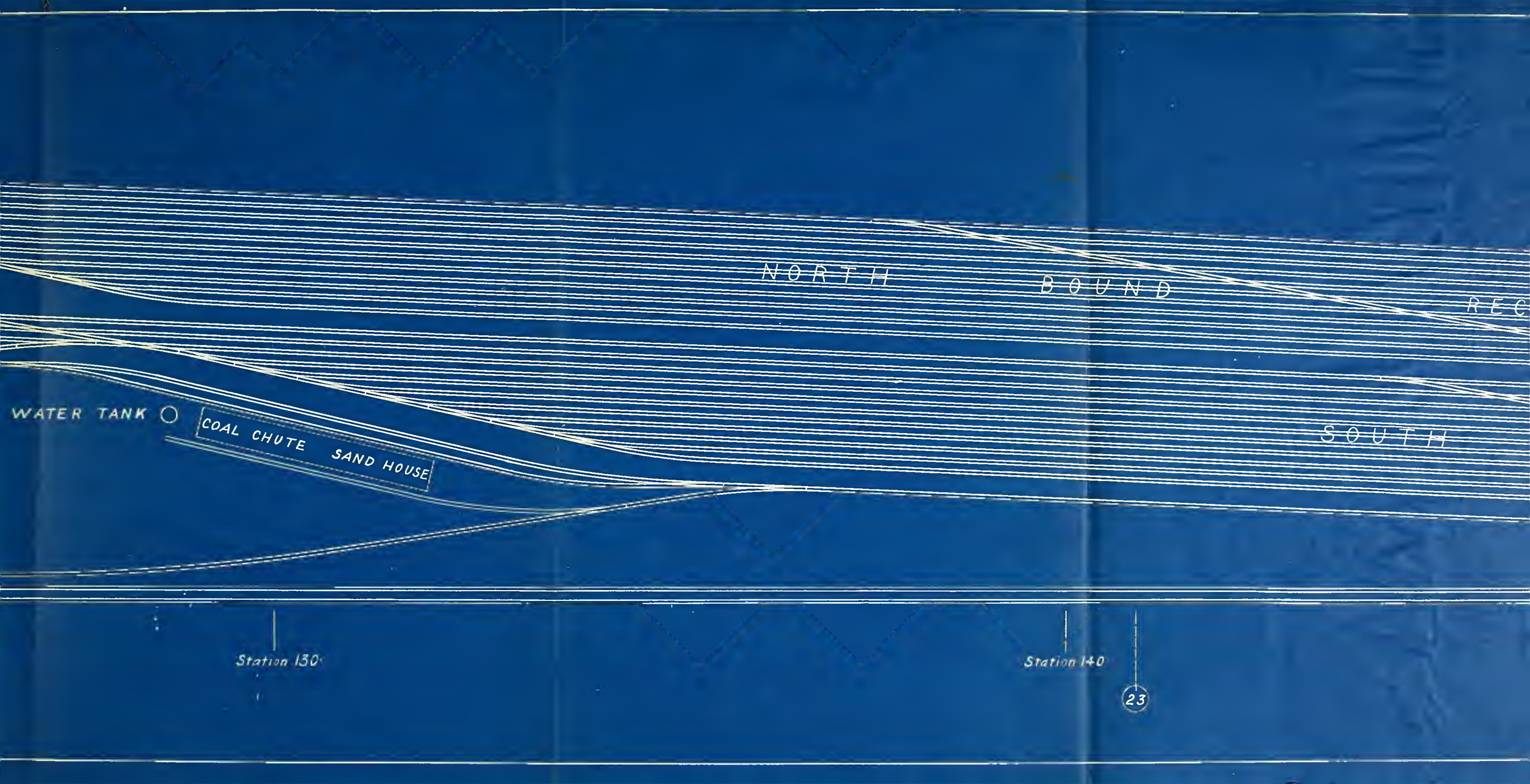
SCALES
OFFICE
POWER HOUSE,
REPAIR SHOP, ETC.
SOUTH HOLD YARD
Station 80
South Bound Hump
Station 85
North Bound Hump
Station 88
Station 90
22

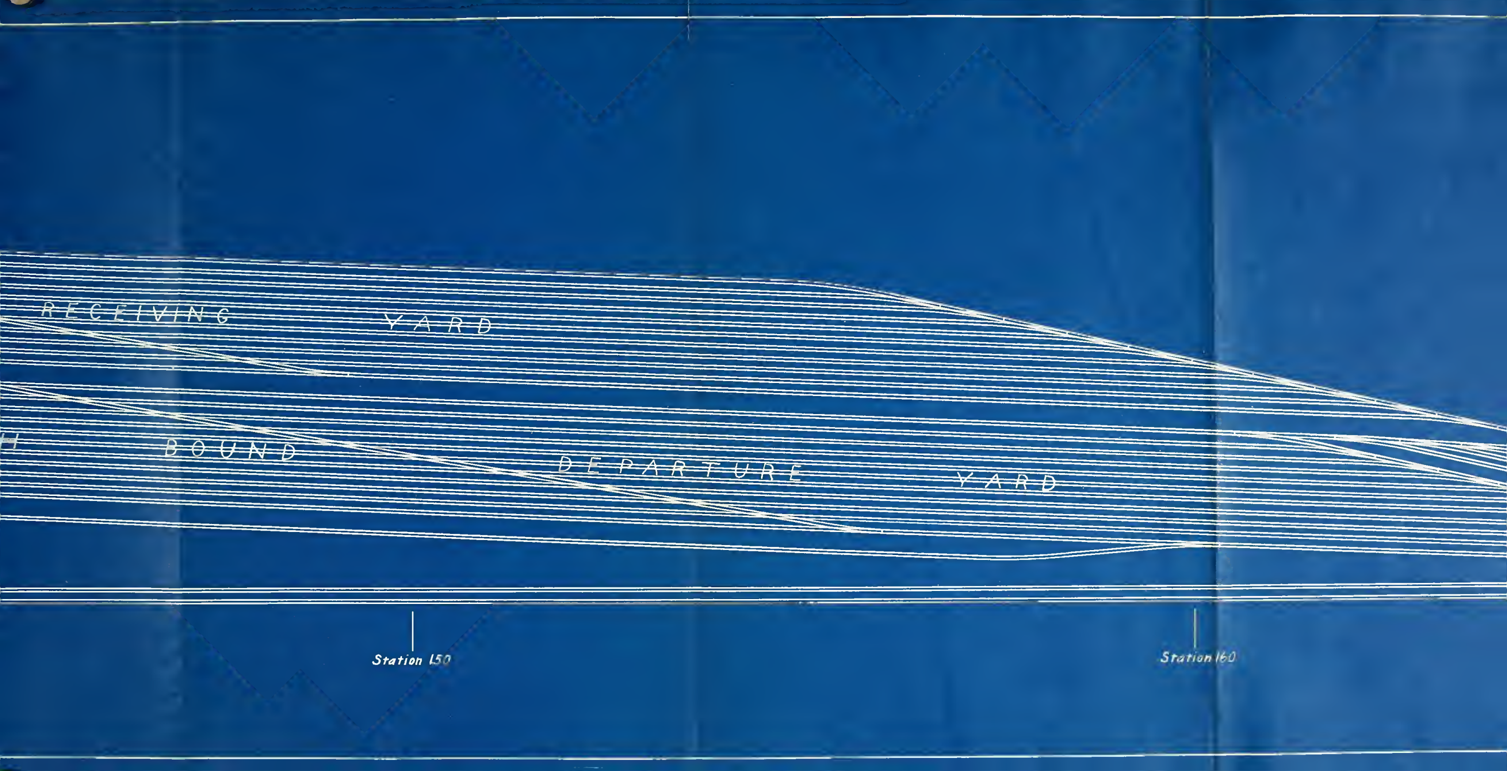


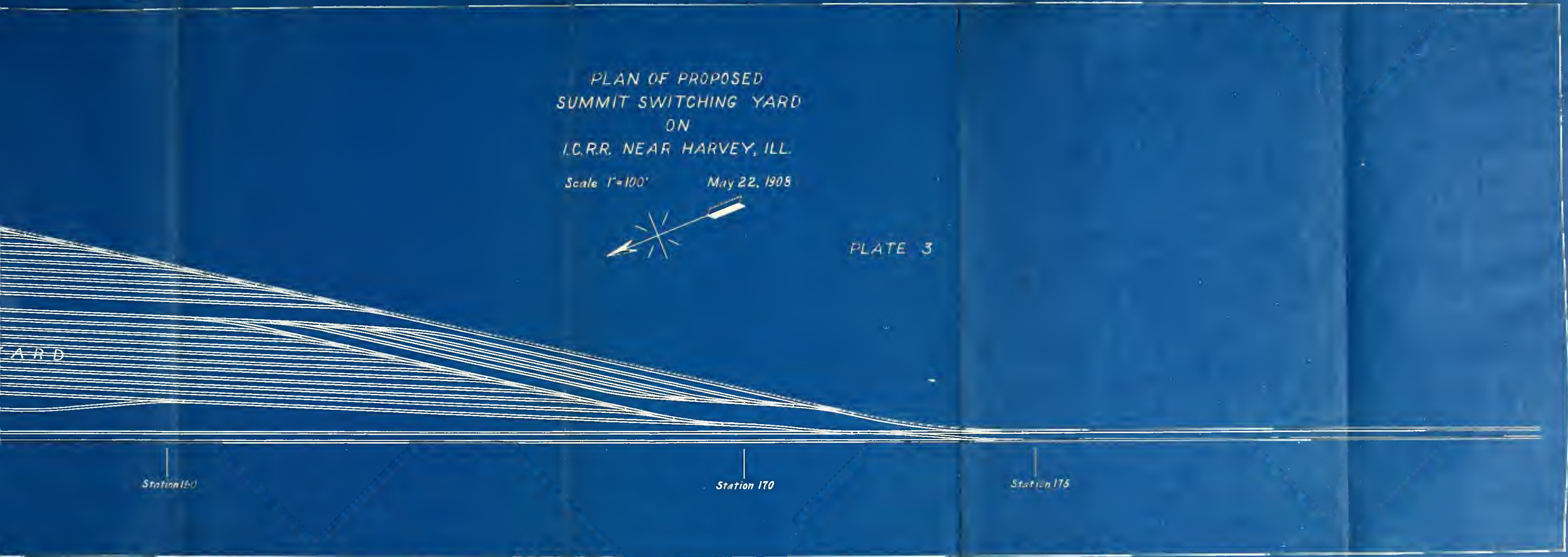
SOUTH BOUND CLASSIFICATIO
Station 100
Station 110



ASSIFICATION YARD
ASH PIT
WATER
Station 110
Station 120

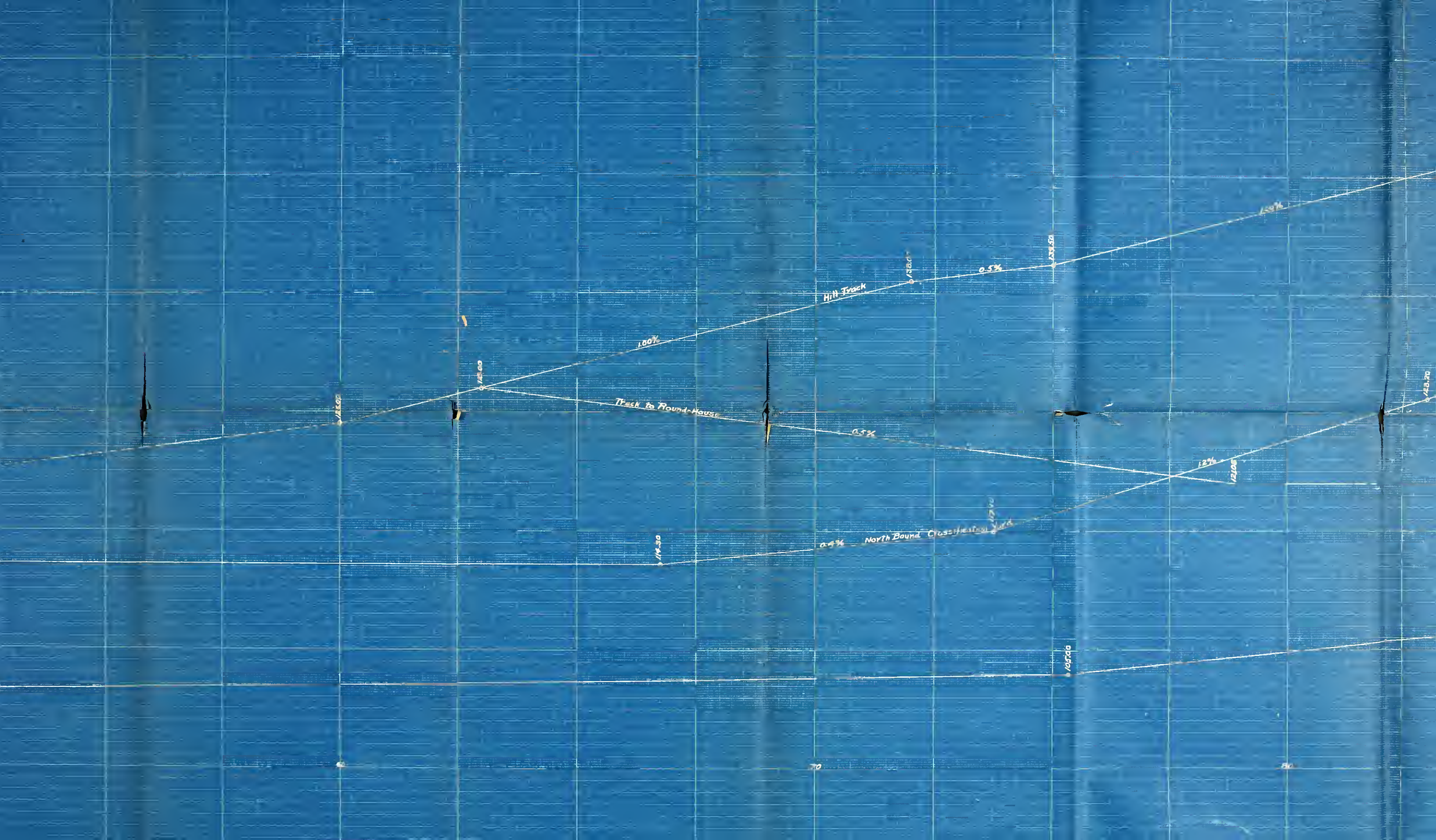

NORTH BOUND REC
SOUTH
WATER TANK
COAL CHUTE
SAND HOUSE
Station 130
Station 140
23


RECEIVING YARD
H BOUND DEPARTURE YARD
Station 150
Station 160


PLAN OF PROPOSED
SUMMIT SWITCHING YARD
ON
I.C.R.R. NEAR HARVEY, ILL.
Scale 1"=100'
May 22, 1908
PLATE 3
Station 160
Station 170
Station 175


PROFILE OF PROPOSED
SUMMIT SWITCHING YARD
ON
I.C.R.R. NEAR HARVEY ILL
Scales
Horizontal - 1" = 100'
Vertical - 1" = 4'
May 22, 1908
PLATE 4
South Bound Receiving Yard
Main Track
0.0625 %
ELEV. 100.00
1
2
4
5
6
7
8
9
10


th Bound Receiving Yard
14.80
0.5%
North Bound Departure Yard
0.00
21

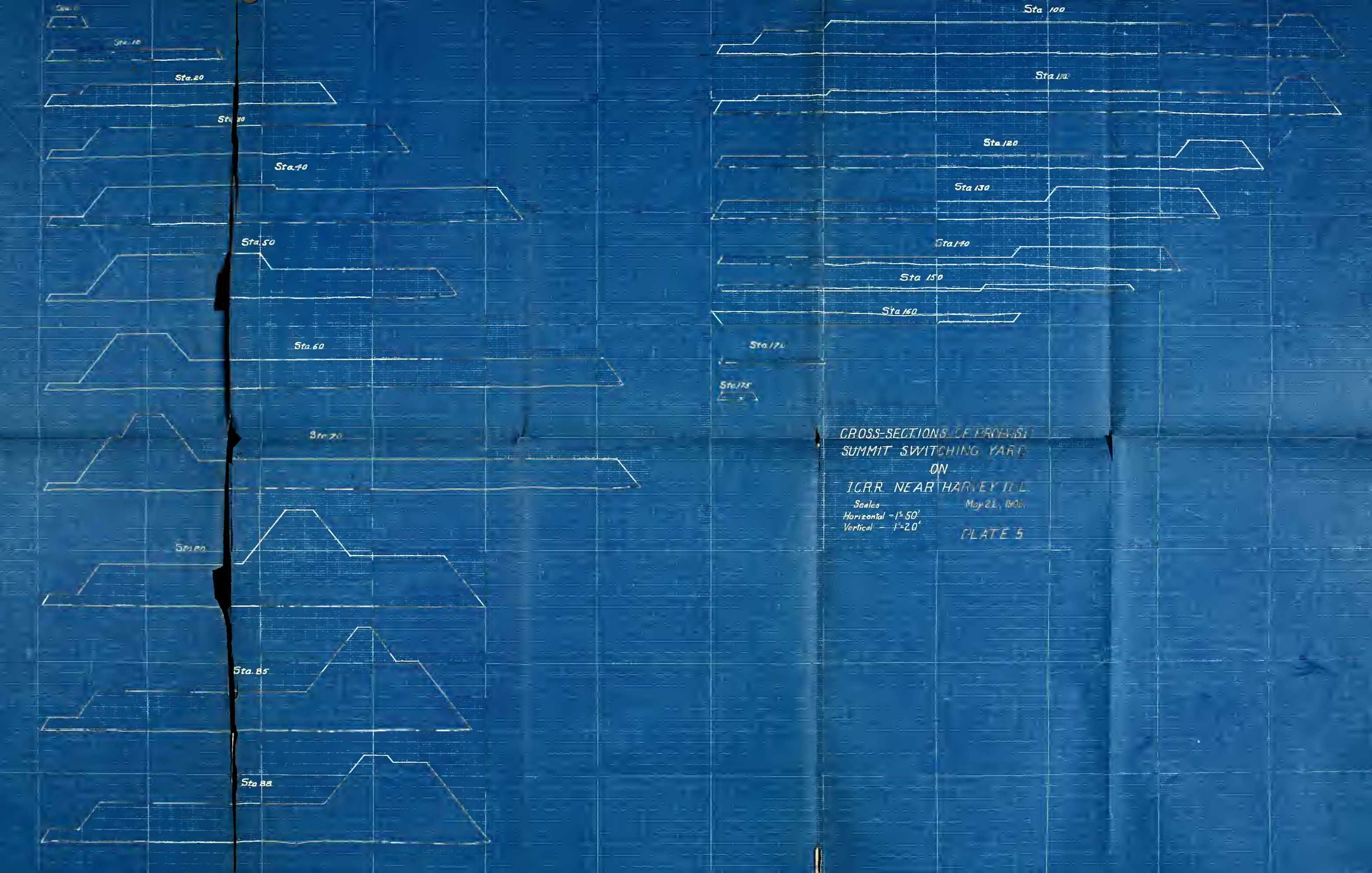

Hill Track
1.00%
0.5%
133.50
Track to Round-House
0.5%
1.2%
121.08
114.30
0.4%
North Bound Classification Yard
105.50
60
70
80


S.E. Hump
150.00
1.5%
N.E. Hump
137.01
138.25
1.0%
4.0%
1.0%
1.2%
138.50
Hill Track
128.20
127.00
126.90
South Bound
0.00
Track to Round House
0.398%
Main Track
Hazel Crest
22
22.17

North Bound Receiving Yard
South Bound Departure Yard
0.00
121.05
123.10
124.00
110
120
130


0.547%
Main Track
PROFILE OF
SUMMIT SWIT
ON
I.C.R.R. NEAR
Scales
Horizontal - 1" = 100'
Vertical - 1" = 4'
23
140
150
160


PROFILE OF PROPOSED
SUMMIT SWITCHING YARD
ON
I.C.R.R. NEAR HARVEY ILL.
Scales
Horizontal - 1" = 100'
Vertical = 1" = 4'
May 22, 1908
PLATE 4
148.00
Homewood
End of Yard
160
170


Sta.20
Sta.40
Sta.50
Sta.60
Sta.80
Sta.85
Sta.88
Sta 100
Sta 120
Sta 130
Sta 140
Sta 150
Sta 160
Sta 170
Sta 175
CROSS-SECTIONS OF PROPOSED
SUMMIT SWITCHING YARD
ON
I.C.R.R. NEAR HARVEY ILL.
Scales
Horizontal - 1"=50'
Vertical - 1"=2.0'
PLATE 5